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# COMPARATIVE ANALYSIS OF SOFTWARE TOOLS FOR AGILE PROJECT MANAGEMENT

***Abstract:*** *In order to achieve a competitive advantage on the market, companies must effectively manage projects, which includes the application of different methodologies, skills and knowledge during the planning, implementation and monitoring of projects. Also, the quality of the software product is largely determined by the management of the realization of that project. Therefore, the use of automated software tools is essential for successful project planning and management. There are many project management tools and software being developed every day to help managers automate the tracking of key parameters of projects throughout their life cycle. This paper describes in detail the features, advantages and disadvantages of the five most commonly used agile project management software, namely Jira, Trello, Asana, Basecamp and MS Project. These software are used in a large number of not only large corporations but also small and medium-sized enterprises. The main goal of the work is a comparative analysis of these software according to criteria such as the size of the organization, the size of the team, the type and scope of the project, for which a certain software is intended/suitable. Different projects require the use of different software tools. When choosing a tool, it is very important to consider the fact that the chosen tool corresponds to the requirements of the project. Each of these project management tools has its own unique features and strengths. It is important to evaluate each tool carefully and consider factors such as ease of use, feature set, and pricing before making a decision.*

***Keywords:*** *project planning, management, project management tools,agile project management software*

## 1. Introduction

Increasing project success rates is one of the biggest challenges facing modern organizations. The authors (Tawfik M. Samarah and Sulieman Al-Safi, 2020) conclude that agile project management tools have a positive impact on project success, but their effectiveness depends on how well they are used by the project team. Due to the failure of the project, large amounts of financial resources can be lost. In order to meet project requirements, projects must be managed effectively. Modern projects are more and more complex, at the same time data monitoring is more and more complex. The use of software tools makes it much easier to see all important project parameters

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and enables better project management. Project management software tools are used for project planning, scheduling, resource allocation and change management, control costs and manage budgeting, quality management and documentation etc (Jones, C. 2004).

Agile project management software tools enable tracking and more efficient and effective project management throughout its life cycle by ensuring tracking of data that is critical to increasing project success. In a study by Toor and Ogunlana (2010), it was found that agile project management practices, including the use of agile project management tools, were associated with higher project success rates. The study found that the use of agile practices led to increased customer satisfaction, better team performance, and higher project quality.

The most significant advantages of agile project management software are: project planning (Multiple project views for planning and scheduling), team collaboration, document management, task management (Gantt charts, kanban boards or task lists to schedule and manage tasks), resource management, cost management etc.

There is a large number of solutions on the market and each of them has some specific features. Some of the software is based on the traditional waterfall methodology, which involves planning all aspects of the project in advance, and some solutions are agile, i.e. adapted to the needs of the environment, i.e. user requirements (Bernardino, 2013). When choosing the appropriate software, it is necessary to take into account several factors - the complexity of the project, the size of the team, the type of project, its scope, etc. On the market there are available proprietary solutions, but also a large number of open source tools (Ferreira & Tereso, 2014). Choosing the right software tool for project management will increase productivity and effectiveness and direct the work of the team in the direction of improving project results. It is important to evaluate each tool carefully and consider factors such as ease of use, feature set, and pricing before making a decision. Each of the software tools has its advantages and disadvantages. Agile tool selection process should consider the project size, complexity, and team characteristics to ensure that the selected agile project management tool is suitable for the specific needs of the project. So, for example Jira is the most comprehensive tool for managing big agile projects, while Asana and Trello are more suitable for small teams and startups. (Fadwa Ahmed and Ahmed M. AlEroud, 2019 ).

The paper provides a comparative overview of agile tools for project management. The motivation for writing the paper is found in the fact that a small number of research papers have been written that provide a comparative analysis of agile project management tools. The contribution of the research paper is reflected in the systematization of the basic characteristics, advantages and disadvantages of each tool in one place.

## 2. Literature review

Research paper evaluates five popular agile project management tools, including Trello, Jira, Asana, Microsoft Project, and Basecamp (A. Elshafei, M. Azab, and E. Hammad, 2019). The authors compare the features, capabilities, and limitations of each tool, and provide recommendations for selecting the best tool based on the needs of the team and project. The authors conclude that Trello and Asana are suitable for small teams, while Jira and Microsoft Project are more appropriate for larger teams with complex projects. Basecamp, according to the authors, is ideal for small projects with simple requirements. Paper (N. Qureshi, M. Iqbal, and A. Khalid, 2019) show survey of agile project management tools and techniques used in software development.

The authors analyze the popularity, features, and limitations of different tools, and discuss the benefits and challenges of using agile methodologies in project management. According to that paper, Jira is the most effective tool for managing agile projects, followed by Trello, Asana, and Basecamp. The authors also identified factors such as ease of use, customization, and integration with other tools as important considerations when selecting an agile project management tool. Paper (" S. Seetharaman and K. Ramanathan, 2018) proposes a framework for selecting agile project management tools based on the project characteristics, team characteristics, and tool features. The authors use a case study to demonstrate the effectiveness of the framework in selecting the appropriate tool for a specific project. The authors suggest that the tool selection process should consider factors such as project size, complexity, and scope, team size, experience, and location, and tool features such as project tracking, team collaboration, and reporting. Paper ( M. Iqbal and N. Qureshi, 2017) presents an empirical study of agile project management tools used in software development. The authors evaluate the effectiveness of different tools in supporting agile methodologies, and identify the factors that influence the selection and adoption of agile project management tools. The authors evaluated the effectiveness of different tools in supporting agile methodologies and identified the factors that influence the selection and adoption of agile project management tools. The study found that Jira is the most commonly used tool for managing agile projects, followed by Trello, Asana, and Basecamp. The authors also found that Jira is the most effective tool for managing agile projects, followed by Trello, Asana, and Basecamp. However, the authors noted that the effectiveness of each tool depends on the specific needs of the team and project.Also, the authors identified several factors that influence the selection and adoption of agile project management tools, including ease of use, customization, integration with other tools, cost, and team preferences.

Similarly, in a study ( N. Nasser and N. Aldmour ,2016) authors showed comparative analysis of some popular agile project management tools, including Trello, Jira, Asana, Redmine, and Agilefant based on various criteria such as project tracking, team collaboration, reporting, customization, and pricing. The study found that Jira is the most comprehensive tool in terms of project tracking and reporting, while Trello and Asana are more suitable for small to medium-sized teams with less complex projects. Basecamp is ideal for small projects with simple requirements, while Agilefant is suitable for distributed teams with a high level of customization. A study by Patah and Carvalho (2016) found that agile project management tools, specifically Jira and Trello, were associated with improved communication and collaboration among team members. The study found that the use of these tools led to better team coordination, faster decision-making, and improved project visibility. Najafi and Mohammadi (2016) found that the use of agile project management tools, including Jira and Trello, led to higher project success rates. The study found that the use of these tools led to improved project planning, better team communication, and more effective project monitoring. In a study by Schuh et al. (2019), it was found that the use of agile project management tools, including Trello and Jira, led to improved project performance in terms of project duration, budget, and quality. The study found that the use of these tools improved team communication, reduced project risks, and increased project transparency.

## 3. Methodology

Software tools can be classified based on the size of the software, the difficulty of use and the scope of the projects for which it is intended. Based on these criteria, the software is divided into three categories: light, medium and heavy. Lightweight software is meant to be designed for short-term, temporary projects or teams and is easy to use. Their disadvantage is that they are not flexible, ie. do not offer the possibility of adaptation to the needs of a specific company. Trello belongs to these softwares. Middleware is more complex and is used in more complex projects where a balance between ease of use and adaptability needs to be established. Examples of these software include Basecamp and Asana. Heavy software stands out because it is highly customizable and has a steep learning curve. They are used for very complex projects and when it is necessary to manage large teams. Representatives of these software are Jira and Ms Project. Jira is more intended for agile projects while MS Project is intended for both traditional or waterfall model projects and agile projects. The paper presents the following software tools for agile project management: Jira, Trello, MS Project, Basecamp, Asana.

Jira is a project management tool developed by Atlassian (see more on https://www.atlassian.com/software/jira).
Jira is one of the most popular project management tools and is a safe choice for organizations. Jira is used by agile teams to plan, track, and manage their work. It provides a range of features, such as sprint planning, backlog management, and progress tracking, that support agile workflows. It is used for agile software development, but can also be used for other types of project management. Jira allows teams to create and track issues or tasks, assign them to team members, and track their progress. It also allows for the creation of custom workflows and issue types to fit the needs of a specific project. Jira has a range of features including a customizable dashboard, agile boards, reports and charts, time tracking, and integrations with other tools like GitHub, Bitbucket, and Confluence.

The biggest benefits are for large companies, which have to coordinate multiple complex projects and need to adjust the work flow. It allows teams to plan and track their work using agile methodologies such as Scrum and Kanban. Jira enables the planning of tasks that need to be performed, monitoring the execution of tasks, managing stakeholders and their requests, creating reports on the results that have been achieved, and managing the budget. This tool features outstanding adaptability and the ability to analyze huge amounts of data. It offers a wide range of features, including backlog management, sprint planning, issue tracking, and reporting. Jira Software also integrates with other Atlassian tools, such as Confluence and Bitbucket, to provide a complete software development solution. Jira is highly customizable, with a wide range of configuration options that allow you to tailor the tool to fit your specific needs. Jira offers a range of collaboration features, including comments, attachments, and mentions. This makes it easy for team members to communicate and share information, and to keep everyone on the same page. The most common disadvantages of this tool are its price, inability to manage costs and assess risks. Also, some plugins and integrations don't work well.

Trello is a a simple and easy-to-use visual project management tool that is particularly useful for agile teams (see more at https://trello.com/agile). Jira can handle large and complex projects, making it a good fit for teams of all sizes. It enables teams to create boards, lists, and cards that represent their workflow, and to move items between these elements as they progress through their work. Trello boards are organized into lists,

and each list contains cards. Agile teams can use Trello boards to create a Kanban board that represents their workflow. This can help teams to visualize work in progress, identify bottlenecks, and optimize their workflow. This tool can be used to plan sprints by creating a new board for each sprint. Teams can then create cards for each task, prioritize the cards, and assign them to team members. Trello's drag-and-drop interface makes it easy to move cards between lists as work progresses. Trello can be used to manage a product backlog, which is a prioritized list of features or tasks that need to be completed. Agile teams can create a backlog board in Trello and use cards to represent features or tasks. They can then prioritize the cards and move them to the appropriate list when they are ready to be worked on. Trello provides a range of collaboration features that enable teams to communicate, share files, and work together on tasks. Trello has a range of power-ups that can be added to boards to extend their functionality. Agile teams can use power-ups like the Agile Tools power-up to add features like burndown charts, velocity tracking, and cumulative flow diagrams to their boards. Trello also offers a range of integrations with other tools, such as Slack and Google Drive.

Some of the basic functions that can be performed within the software tool Trelo are: agile project management, budgeting, monitoring problems that arise during project implementation, reporting, resource management, etc. Trello is a highly flexible tool that can be adapted to fit a wide range of project management workflows and use cases. rello allows team members to collaborate and communicate in real-time, making it easy to share updates, feedback, and ideas. Its commenting and tagging features make it easy to stay connected and on the same page. Its customizable boards, lists, and cards make it easy to create a system that works for your team. Its user-friendly interface and flexible design make it easy to customize to fit a wide range of workflows and use cases.

Trello may have some limitations when it comes to certain project management requirements. One potential deficiency is that Trello may not provide robust reporting capabilities for tracking project progress or generating detailed reports. Additionally, Trello may not be the best choice for large-scale or complex projects, as it may not offer the same level of functionality as more advanced project management tools. It also may not be the best fit for teams that require extensive collaboration features or complex task dependencies.

Asana is a flexible project management tool that can be used for both traditional and agile projects (see more on https://asana.com/agile). Asana provides agile teams with a range of features, such as task tracking, project management, and team collaboration. It can be used to manage all aspects of agile projects, from planning to execution. Asana can be used for ask tracking because Asana enables teams to create tasks, assign them to team members, and track progress on these tasks. This can be particularly useful for agile teams, as it enables them to break down work into small, manageable tasks and track progress on these tasks over time. Also, Asana can be used to manage a product backlog, which is a prioritized list of features or tasks that need to be completed. Agile teams typically use a backlog to prioritize work and ensure that the most valuable items are completed first. This software tool is used to plan sprints, which are short periods of time (typically one to four weeks) during which a team works to complete a set of tasks. Agile teams typically plan sprints based on their backlog, with the most important items being selected for each sprint. This tool provides a visual project management feature called Kanban boards, which can be used to visualize work in progress and optimize workflow. Agile teams often use Kanban boards to track

progress on tasks and identify bottlenecks in the workflow. Asana provides a range of collaboration features that enable teams to communicate, share files, and work together on tasks. Agile methodologies emphasize collaboration, so these features can be particularly useful for agile teams.

Asana provides extensive reporting capabilities, with built-in reports that show key metrics such as project progress, task completion rates, and team workload. Asana is highly customizable, with a range of features that allow you to tailor the tool to fit your specific needs. You can create custom fields, project templates, and automation rules to match your team's processes and requirements. Asana also offers a range of integrations with other tools, such as Google Drive and Slack. Asana also has certain disadvantages. While Asana offers many powerful features and customization options, some users may find it overwhelming or difficult to navigate. The sheer number of options and settings can be daunting for new users, and it may take some time to fully understand how to use the tool. Also, Asana price can be relatively high compared to some other project management tools, particularly for larger teams or organizations that require more advanced features. Asana does not include built-in time tracking functionality, which may be a drawback for teams that require this feature for accurate project management or billing.

Microsoft Project is a project management tool developed by Microsoft, which supports both traditional and agile project management methodologies. In Microsoft Project, agile project management can be implemented through the use of agile boards, which provide a visual representation of work in progress, and through the use of sprints, which are time-boxed iterations of work. Microsoft Project enables team members to collaborate in real-time, share ideas, and provide feedback on tasks. Team members can use Teams, Outlook, or SharePoint to communicate and share files (Microsoft. Collaboration in Project for the web, https://support.microsoft.com/en-us/office/collaboration-in-project-for-the-web-8d4b3644-4efc-444c-aeaa-9b78c2b1d3c3).

Microsoft Project includes powerful scheduling features that allow to schedule and track tasks, assign resources, and manage timelines. This can be useful for managing agile sprints or iterations. Microsoft Project allows you to manage resources such as team members, equipment, and materials, which can be useful for agile teams that need to manage resource availability and allocation. Another feature of this tool is that it supports the creation and tracking of agile artifacts such as user stories, backlogs, and burndown charts. Agile project management is based on an iterative approach, with regular feedback and adaptation. While Microsoft Project can support this to some extent, it may not be as flexible as other agile project management tools.

Microsoft Project is not specifically designed for agile methodologies, and it lacks some of the features that are essential for agile teams, such as sprint planning, task prioritization, and backlog management. Microsoft Project can be complex and difficult to use, particularly for teams that are new to project management or agile methodologies. Agile project management emphasizes collaboration and communication between team members, and Microsoft Project may not offer the same level of real-time collaboration features as other agile project management tools. Microsoft Project relies on a fixed hierarchy of tasks, which can be challenging for agile teams that need to manage changing requirements and prioritize tasks dynamically.

Basecamp is a simple and straightforward agile project management tool that offers a range of features for task management, team collaboration, and reporting (see more on

https://basecamp.com/). It is suitable for smaller teams or simpler projects. Basecamp has a simple and intuitive interface that is easy to use, which can be helpful for agile teams that want to focus on their work rather than spending time learning a new tool. Basecamp offers a range of collaboration features, including message boards, to-do lists, file sharing, and real-time chat, which can help agile teams stay connected and communicate effectively. Basecamp includes time tracking features, which can help agile teams monitor their progress and track how much time is being spent on each task or project. As a disadvantage of this tool we can state that Basecamp has limited customization options, which may not be suitable for agile teams that need more flexibility and control over their workflows. Also, Basecamp has limited reporting capabilities compared to other agile project management tools, which may make it difficult to track and analyze project metrics.

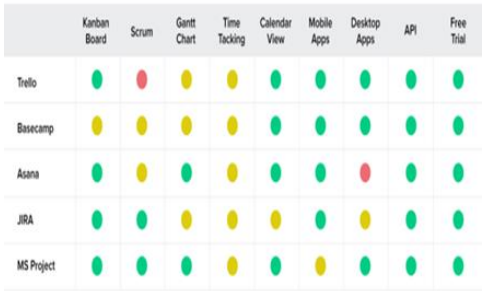
## 4. Results and discussion

Trello is ideal for small, agile teams. It is easy to use and offers excellent flexibility and customization options. However, it may not be the best choice for larger teams or complex projects. Asana can be used for a wide range of projects, while Jira is specifically designed for software development and agile project management. Asana has more collaboration features, such as team communication and file sharing, which can help team members work together more efficiently. Jira offers a wide range of features, including sprint planning, backlog management, and reporting. It is suitable for larger teams and complex projects, but it may have a steeper learning curve and be more expensive than other tools. Jira offers more options for customization and automation of workflow, which can be very useful for complex projects, while Asana offers a more straightforward approach to workflow management

Asana provides a clear overview of the project, allowing team members to see what needs to be done, who is responsible for each task, and the project's overall progress (see more on"The Best Agile Project Management Tools of 2021," The Blueprint, https://www.fool.com/the-blueprint/agile-project-management-tools/). Asana offers more advanced workflow features, such as task dependencies, custom fields, and automation, which can be very useful for complex projects. Asana includes task management, collaboration, and reporting. However, it may not offer as many agile-specific features as other tools, and the reporting capabilities may be limited for some users. While Microsoft Project can be used to support agile project management, it may not offer as many agile-specific features as other tools. It may also be more complex and time-consuming to set up and use effectively, which may not be suitable for agile teams that need to be nimble and adaptable. Basecamp offers collaboration features, task management, and time tracking, but it may lack some of the advanced agile-specific features that are available in other tools.

Basecamp has a simpler and more user-friendly interface compared to Jira, which can be more complex and overwhelming, especially for beginners. Basecamp is designed to encourage team collaboration, with features like message boards, group chat, and file sharing. Trello has a more visual and intuitive interface, which makes it easy to use and understand, especially for beginners. Trello, on the other hand, offers a simpler approach to workflow management. Table 1. provides a comparative analysis of tools for agile project management.

**Table 1.** Comparative analysis of agile project management tools



| | Kanban Board | Scrum | Gantt Chart | Time Tacking | Calendar View | Mobile Apps | Desktop Apps | API | Free Trial |
|---|---|---|---|---|---|---|---|---|---|
| Trello | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Basecamp | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Asana | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| JIRA | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| MS Project | ● | ● | ● | ● | ● | ● | ● | ● | ● |

## 5. Conclusion

Different projects require the use of different tools. When choosing a tool, it is necessary to take into account the type of project, the complexity of the project, the size and choose the tool that corresponds to the requirements of that project. For example, maybe the team is used to using Jira, but for short and simple projects, Trello is a better choice. Jira offers a range of features, including user story mapping, sprint planning, backlog prioritization, and real-time reporting. Jira integrates well with other tools such as GitHub, Confluence, and Slack, making it a popular choice for Agile teams. Trello allows teams to organize tasks into boards, lists, and cards. It offers a range of features, including team collaboration, task assignments, and due dates (The Digital Project Manager, "Trello vs Asana: The Best Project Management App?", https://thedigitalprojectmanager.com/trello-vs-asana-best-project-management-app/). Trello has a more visual and intuitive interface, which makes it easy to use and understand, especially for beginners. Asana enables task management, team collaboration, and project tracking. It has a user-friendly interface and allows teams to track progress in real-time. Basecamp is suitable for smaller teams or simpler projects. It enables task management, team collaboration, and reporting. Trello has a more visual and intuitive interface, which makes it easy to use and understand, especially for beginners (Adams, P. B., Preston, D. S., & Tilley, S. R., 2014). Microsoft Project provides a robust set of features for project scheduling and tracking, including Gantt charts and resource management and integrates with other Microsoft tools such as Teams, Excel, and Power BI (TechRepublic, "Microsoft Project vs. Asana: Which is better for project management?", https://www.techrepublic.com/article/microsoft-project-vs-asana-which-is-better-for-project-management/).

## References:

Adams, P. B., Preston, D. S., & Tilley, S. R. (2014). An experimental comparison of three agile project management tools. Journal of Software Engineering and Applications, 7(4), 215-227. https://doi.org/10.4236/jsea.2014.74021

Asa Cajander, Tony Clear. (2009). Students Analyzing their Collaboration in an International Open Ended Group Project. In FIE'09 Proceedings of the 39th IEEE international conference on Frontiers in education conference (pp. 1-6). ISBN: 978-1-4244-4715-2.

Dzone. (n.d.). Asana vs Trello vs Monday vs Basecamp vs ClickUp: Which Project Management Software to Choose? Retrieved from https://dzone.com/articles/asana-vs-trello-vs-monday-vs-basecamp-vs-clickup-which-project-management-software-to-choose

Capterra. (2021). Agile Project Management Software. Retrieved from https://www.capterra.com/agile-project-management-software/

Joo Tan, Mark Jones. (2008). An Evaluation of Tools Supporting Enhanced Student Collaboration. In IEEE Xplore - Frontiers in Education Conference, 38th Annual FIE 2008 (pp. F3H-7 - F3H-12).

Agile Alliance. (n.d.). Jira vs Asana: Which Project Management Tool is Right for You? Retrieved from https://www.agilealliance.org/jira-vs-asana-which-project-management-tool-is-right-for-you/

Project-Management.com. (n.d.). Jira vs Asana vs Trello: A Comparison of Top Project Management Tools. Retrieved from https://project-management.com/jira-vs-asana-vs-trello-a-comparison-of-top-project-management-tools/

Mattila, A., Koivumäki, T., & Huuskonen, P. (2014). Comparison of agile project management tools: A case study. Journal of Software Engineering and Applications, 7(12), 1123-1137. https://doi.org/10.4236/jsea.2014.712100

Najafi, M., & Mohammadi, R. (2016). Effectiveness of agile project management tools on project success. Procedia-Social and Behavioral Sciences, 226, 195-202.

Qamar, A., Qureshi, M. I., & Khan, N. (2019). A comparative analysis of agile project management tools. Journal of Software Engineering and Applications, 12(7), 295-306. https://doi.org/10.4236/jsea.2019.127020

Schuh, G., Smolnik, S., & Schulte, S. (2019). Benefits of agile project management: A systematic literature review. Journal of Business Research, 98, 365-376.

Toor, S. R., & Ogunlana, S. O. (2010). Beyond the iron triangle: Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects. International Journal of Project Management, 28(3), 228-236.

Tuchinda, R., & Sirisombatwong, S. (2020). Trello-based agile project management for software development. Journal of Software Engineering and Applications, 13(5), 223-238. https://doi.org/10.4236/jsea.2020.135015

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